

Factors Associated With the Intake of Dietary Supplements

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Research on the relationship between diet and disease has increased interest in nutrition and in determining the nutrients and their levels that are related to adequate health (7). The latest report on nutrition monitoring of the U.S. population classifies the dietary intake of iron and calcium as current public health issues (4). This classification signifies an inadequate intake across many age, gender, and ethnic groups, and there is associated biochemical, clinical, or anthropometric evidence of adverse health conditions. Regarding intake, other minerals (e.g., magnesium, potassium, zinc, and copper) and vitamins (e.g., A, C, E, B₆, and B₁₂) are considered potential public health issues for which further study is required.

While no dietary supplement can replace a healthful diet, experts agree that providing the body with adequate nutrient intake is especially important in light of the increasing prevalence of degenerative diseases: for example, heart disease, cancer, and osteoporosis (21). Because of increasing awareness and knowledge about the link between nutrition and health, as well as the rising costs of healthcare, many Americans are embracing self-medication with dietary supplements aimed at preventing diseases (11). Evidence has been accumulating that a variety of dietary components may have a protective effect against cancer; therefore, many argue that supplements are necessary—because

they extend beyond the prevention of deficiency diseases to the prevention of chronic diseases such as cancer (14). For example, the possible protective effects against certain diseases of several nutrients, especially vitamins C and E and beta carotene, have been well publicized (13).¹

Consequently, public interest in dietary supplements has been intense. The Council for Responsible Nutrition reported a 19-percent increase in retail sales of supplements between 1987 and 1992 and estimated that about 40 to 50 percent of the U.S. population uses vitamin and mineral supplements (18). According to the American Dietetic Association 1997 Nutrition Trends Survey, 35 percent of Americans believe vitamin supplements are necessary to ensure proper health, an increase from prior surveys (28 percent in 1995 and 27 percent in 1993 and 1991) (2).

Despite the popularity and potential benefits of dietary supplements, few studies have examined the effect of sociodemographic, lifestyle, and attitudinal factors on the intake of dietary supplements. Using the 1992 National Health Interview Survey, researchers found that demographic and lifestyle

¹Omenn et al.'s (14) study, combined with the ATBC Cancer Prevention Study (1) and the Physicians' Health Study (6), however, brings to doubt the efficacy and safety of supplemental beta carotene or vitamin A in reducing the burdens of cancer or heart disease in certain populations.

characteristics and the diet of supplement users are typical factors associated with low risk of chronic disease (18). Analyzing the National Health and Nutrition Examination Survey (NHANES) II data collected between 1976 and 1980, other researchers found that supplement use was more common among women, Whites, older persons, and those with more years of education and higher income (10).

Stewart et al. (19) and Subar and Block (20) found that supplement use was most common in the western United States and among whites, women, older persons, those with higher incomes, those with higher education, and non-smokers. Kolasa, Lackey, and Poehlman (9) found that special diet and attitudinal variables, such as an individual's willingness to make needed dietary changes, influence the intake of vitamin supplements. A review of research on the effects of exercise on vitamin status revealed that vitamin supplementation continues to be widely practiced by athletes in an effort to deal more readily with the rigors of training (3).

Most of these studies have also disclosed the positive correlation between vitamin supplement intake and more healthful diets. These studies, however, used older data sets when dietary supplements were not as popular. Thus the findings may no longer represent current conditions. The intense scientific and popular interest in recent years in dietary supplements has increased the need for more current information on factors affecting individual supplement use. The objective of our study is to better understand the relationships between sociodemographics, lifestyle characteristics, and a number of attitudinal factors and the intake of dietary supplements.

Table 1. Description, means, and percentages of the variables used in the analysis

Name	Description	Mean/ percent
<u>Dependent variable</u>		
Suppl	1 if respondent is taking dietary supplement; 0 otherwise	0.49
<u>Independent variables</u>		
Income	Household income (thousand dollars)	33.59
Black	1 if respondent is Black; 0 otherwise	0.12
Other	1 if respondent is of some other race; 0 otherwise	0.05
Age	Age of respondent in years	48.48
City	1 if respondent resides in the city; 0 otherwise	0.32
Nonmetro	1 if respondent resides nonmetro area; 0 otherwise	0.26
Fstamp	1 if respondent is a food stamp recipient; 0 otherwise	0.08
Preglact	1 if respondent is pregnant or lactating; 0 otherwise	0.01
Male	1 if respondent is male; 0 otherwise	0.48
Unemployed	1 if respondent is unemployed; 0 otherwise	0.40
HHsize	Household size	2.66
Grade	Number of years of education	12.64
BMI	Body mass index	26.36
Health ¹	Respondent's perception of own health	2.52
Specdiet	1 if respondent is on special diet; 0 otherwise	0.18
Smoke	1 if respondent smokes; 0 otherwise	0.25
Know ²	Degree of agreement with the statement that "eating a variety of foods each day gives you all the vitamins and minerals you need"	3.06
Disease ²	Degree of agreement with the statement that "what you eat can make a big difference in your chance of getting a disease, like heart disease or cancer"	3.47
Belief ²	Degree of agreement with the statement that "the things I eat and drink now are healthy so there is no reason for me to make changes"	2.61
Exercise ³	How often the respondent exercises	3.83
TVhours	Number of hours respondent watched TV or videotape yesterday	2.54

Note: Base group includes White, suburban, not a food stamp recipient, not pregnant or lactating, female, employed, not on a special diet, not smoking.

¹Responses range from 1 to 5 where 1 = "poor" and 5 = "excellent."

²Responses range from 1 to 4 where 1 = "strongly disagree" and 4 = "strongly agree."

³Responses range from 1 to 6 where 1 = "daily" and 6 = "rarely or never."

Methods

We hypothesized that the likelihood of taking dietary supplements is a function of income, race, gender, urbanization, whether the individual is a food stamp recipient, whether the individual is pregnant or lactating, age, employment status, household size, education, body mass index (BMI), the individual's perception of own health, special diet status, whether the individual smokes, degree of exercise, number of television hours, a nutritional knowledge factor, a diet-disease variable, and a belief about diet factor. Therefore, our empirical model is specified as follows:

$$\text{Suppl} = f_i(\text{income}, \text{Black}, \text{other}, \text{age}, \text{city}, \text{nonmetro}, \text{fstamp}, \text{preglact}, \text{male}, \text{unemployed}, \text{hhsz}, \text{grade}, \text{BMI}, \text{health}, \text{specdiet}, \text{smoke}, \text{know}, \text{disease}, \text{belief}, \text{exercise}, \text{tvhours}).$$

The description of the variables and their means/percentages are exhibited in table 1. The significance level chosen for this analysis was 0.05.² The dependent variable is measured on a scale that is discrete and binary. Hence, a logit model, estimated through maximum likelihood, is used in the analysis.

Data

We used the 1994 Diet and Health Knowledge Survey (DHKS) from the U.S. Department of Agriculture. The target individuals in this survey were randomly selected from among eligible sample persons 20 years of age and older who had provided a complete

Day 1 intake record in the 1994 Continuing Survey of Food Intakes by Individuals (CSFII). Data in this survey were collected by telephone interviews (in-person interviews for those without telephones). A total of 1,879 individuals participated in the DHKS survey. Because of some incomplete data, we used 1,525 observations in this analysis.

Results and Discussion

Food stamp recipients were less likely to take dietary supplements than those who were not food stamp recipients (table 2). This finding may have implications for any future plan to allow recipients to use food stamps to purchase dietary supplements. Results also indicate that those who were pregnant or lactating were more likely to take dietary supplements than those who were not pregnant or lactating. This result is particularly important; because, those who are pregnant or lactating are more in need of nutrients to sustain a healthy body and nourish a fetus or a baby.

As expected, males were less likely to take dietary supplements than were females, a finding that is consistent with those of Koplan et al. (10) and Slesinski, Subar, and Kahle (18). Previous studies imply that men are typically less interested in diet and health issues than are women (8,15). A study of Washington State residents revealed that females reported significantly more changes to healthful dietary practices than males reported (15).

Household size was negatively related to the likelihood of taking dietary supplements. This finding suggests that larger households may not be able to afford supplements for all members.

Results generally suggest that those who are male, food stamp recipients... are less likely to take dietary supplements than others are.

²No degrading multicollinearity problems were detected based on the collinearity diagnostic tests conducted.

Education was positively related to the likelihood of taking dietary supplements, a result that is consistent with other research (10,18).

Individuals with a higher BMI and those who believed their health was better were less likely than their counterparts to take dietary supplements. The reason for these results is not clear. However, it is possible that those with a higher BMI or those who believe that their health is better may think that they do not need dietary supplements; because, they perceive themselves to have adequate intakes of vitamins already. Although not directly comparable, this finding may be related to Pelletier and Kendall's (16) hypothesis that supplement users with unhealthy attitudes and beliefs may be using supplements to compensate for a diet and lifestyle that they perceive to be unhealthy. Their study suggested that this hypothesis may not apply equally to all age and ethnic groups.

Individuals who were on a special diet, however, were more likely than their counterparts to take dietary supplements; whereas, smokers were less likely than nonsmokers to take dietary supplements. The finding regarding the special diet is important: previous studies suggest that patients who are on a special diet (e.g., weight control) may not get enough vitamins in their food (9).

Our finding about dietary supplement usage among smokers and nonsmokers is consistent with prior expectations (because smokers are believed to be less interested in health) and is also consistent with those of Subar and Block (20).

Those who agree with the statement that "eating a variety of foods each day gives you all the vitamins and

Table 2. Parameter estimates of the model

Variable	Parameter	Standard error	Odds ratio
Intercept	1.850*	0.643	
Income	0.003	0.002	1.003
Black	0.165	0.180	1.179
Other	-0.343	0.256	0.709
Age	0.003	0.004	1.003
City	-0.136	0.133	0.873
Nonmetro	-0.102	0.137	0.903
Fstamp	-0.418*	0.200	0.658
Preglact	2.202*	1.067	9.040
Male	-0.551*	0.112	0.576
Unemployed	-0.066	0.141	0.935
HHsize	-0.149*	0.043	0.861
Grade	0.061*	0.022	1.063
BMI	-0.037*	0.010	0.963
Health	-0.117*	0.058	0.890
Specdiet	0.499*	0.148	1.647
Smoke	-0.324*	0.131	0.724
Know	-0.186*	0.064	0.830
Disease	0.031	0.072	1.031
Belief	0.035	0.063	1.036
Exercise	-0.118*	0.029	0.888
TVhours	-0.004	0.023	0.996
Sample size	1525		
McFadden R ²	0.08		
Correct prediction (%)	61.4		

*p ≤ 0.05.

minerals you need" were less likely to take dietary supplements. Although not directly comparable, this finding may be related to, and consistent with, research that indicates that users of dietary supplements have diets more consistent with current dietary guidelines (18). Individuals who exercised less often than others were less likely to take dietary supplements, a finding that is consistent with that of Armstrong

and Maresh (3) concerning the effects of dietary supplementation on exercise performance. In general, the results pertaining to gender and education were consistent with those of previous studies. Unlike the findings in previous studies, the results in the present study indicate that race, age, and income do not statistically affect the likelihood of taking dietary supplements.

Concluding Remarks

The possible benefits and detrimental effects of dietary supplements to health promotion and disease prevention have been increasingly documented in scientific studies and the popular press (5,12,14,17). Consequently, many supplements—that bridge the gap of marginal diets—are now available at retail stores (7). Yet few studies have analyzed the influence of consumers' sociodemographic factors on the intake of dietary supplements. This study updates past work by using recent data to analyze the effect of not only sociodemographic factors but also lifestyle characteristics and attitudinal factors on the intake of dietary supplements.

Results generally suggest that those who are male, food stamp recipients, not pregnant or lactating, in larger households, less educated, with higher BMI, with higher perception of their own health, not on special diet, smokers, and those who do not often exercise are less likely to take dietary supplements than others are. In addition, people who believe that eating a variety of foods each day gives all the vitamins and minerals they need are less likely than others to take dietary supplements. This study did not analyze actual nutrient intakes; thus, more work is needed to pinpoint definitively those individuals who are at most risk of consuming inadequate vitamins/minerals.

Based on the number of respondents in this study (49 percent) who took dietary supplements, we believe it is absolutely critical that researchers consider nutrients from supplements, along with dietary sources, when assessing individual intake and when monitoring the nutrient intake of the U.S. population. According to Slesinski, Subar, and

Kahle (18, p.5), "failure to include nutrients from supplements may produce errors in nutrient estimates and misclassifications of persons with regard to their total intake." Dietary surveys (e.g., CSFII-DHKS) should also make sure that intakes from supplements are collected so that researchers can analyze not only intakes from foods consumed but also intakes from supplements taken. Admittedly, technical and

methodological difficulties are inherent in collecting detailed information on supplement intake, not to mention the costs associated with such surveys in terms of respondent burden and survey costs. These problems must be addressed, however, if issues about the intake of dietary supplements ever can be definitively answered by researchers.

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